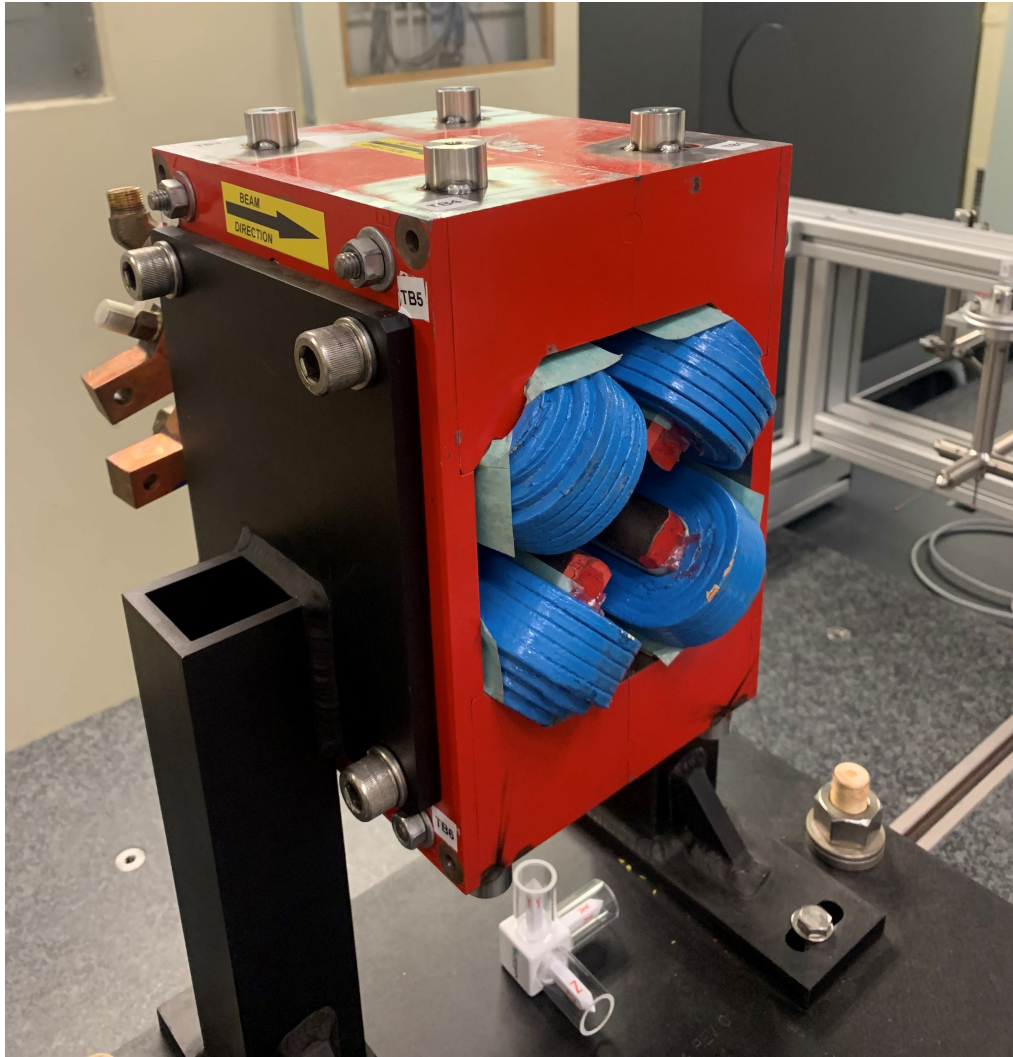


LCLS II Quadrupole Fiducialization Report 1.51Q7.0 Quadrupole Magnet (Refurbish)



Inspector : K. Caban
Engineer : T. Tan
Drawing No. : SA-902-708-54
Barcode # : 4068
Mfg. S/N : 1.5Q7-2/QDG003

Coordinate System Setup

Spatial Alignment

The Spatial Alignment of the magnet is created through a composite best-fit of the pole tips. Each pole tip scanned 0.367 inch inboard from the upstream magnet face and the downstream magnet face. A composite best-fit of the upstream poles and the downstream poles is made with the nominal pole tip shape and location. An axis is created through the two best-fit centerpoints. This axis is the spatial alignment of the magnet and defines the Z axis.

Planar Alignment

The Planar Alignment of the magnet is the created by averaging the rotations of the composite best-fits of the upstream pole tips and downstream pole tips. This direction defines the Y and X directions of the magnet.

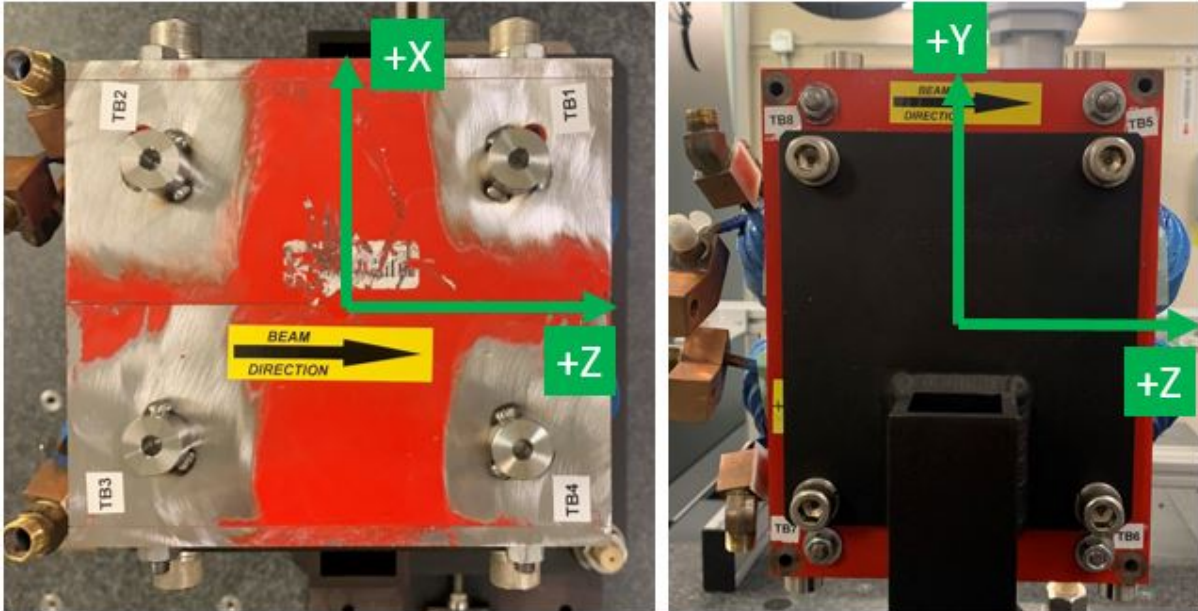
Coordinate Origins

The origins of the magnet coordinate system are as follows. The XY origin lies on the axis of spatial alignment. The Z origin is the intersection of the mid-plane between the upstream and downstream magnet faces and the Z axis.

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Tooling Ball Locations @ 1.000 in. Offset



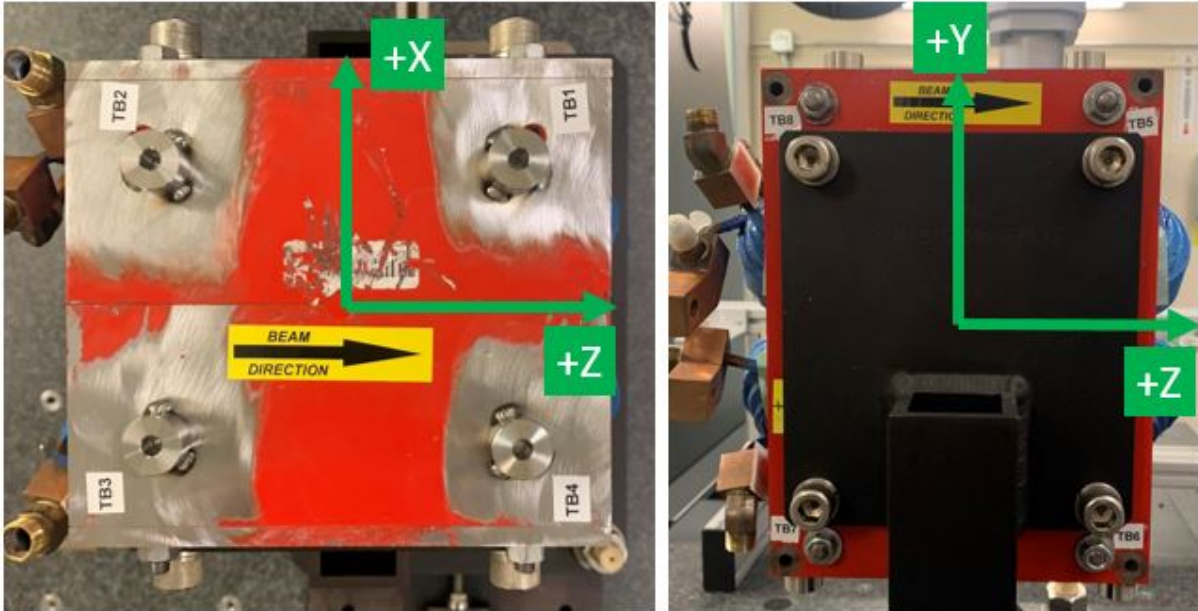
Tooling Ball	X Coord.	Y Coord.	Z Coord.
TB 1	1.7512	6.1226	2.2435
TB 2	1.7534	6.1238	-2.2649
TB 3	-1.7585	6.1223	-2.2748
TB 4	-1.8176	6.1227	2.2914
TB 5	-4.1255	4.3303	3.1810
TB 6	-4.1227	-4.2883	3.1707
TB 7	-4.1209	-4.3078	-3.1994
TB 8	-4.1289	4.2602	-3.2311

Dimensions in Inch

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Tooling Ball Locations @ 0.3125 in. Offset



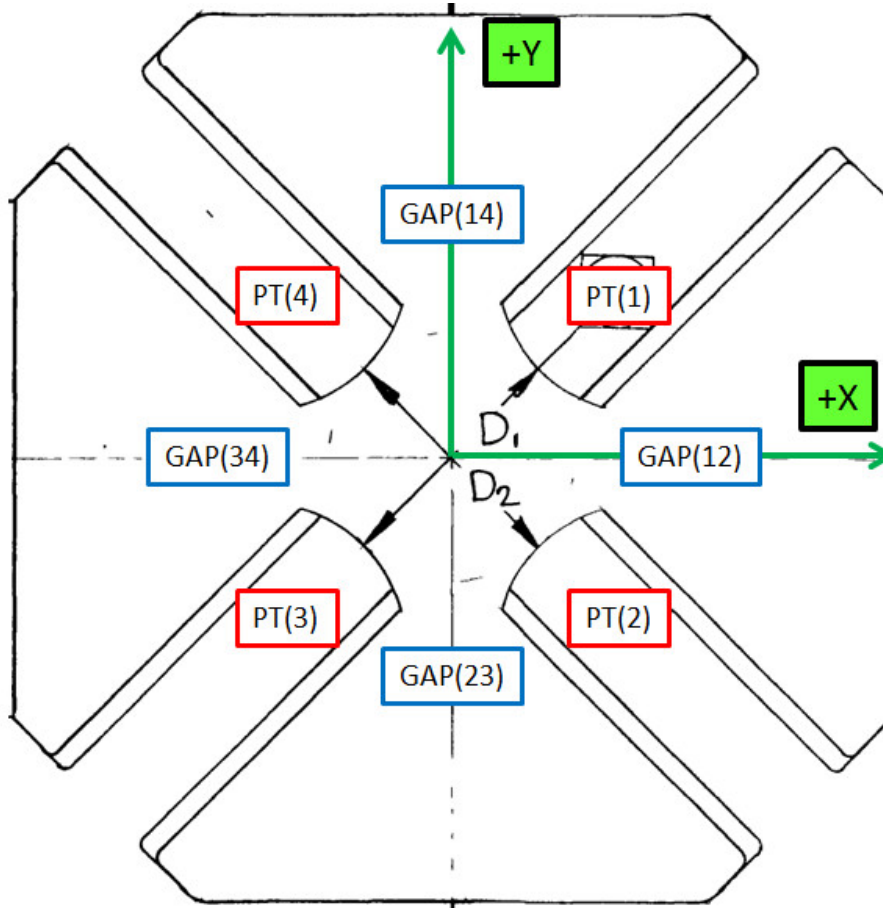
Tooling Ball	X Coord.	Y Coord.	Z Coord.
TB 1	-2.4162	5.4304	-3.0660
TB 2	-2.4383	5.4313	3.0744
TB 3	2.4333	5.4354	3.0658
TB 4	2.3969	5.4352	-3.0303
TB 5	3.4341	4.3142	-3.1977
TB 6	3.4357	4.2870	3.1758
TB 7	3.4392	-4.3366	3.1831
TB 8	3.4405	-4.2663	-3.2331

Tooling Ball Locations are 5/16 inch above Tooling Ball Adapter Plane
Dimensions in Inch

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Pole Tip Gap Measurements



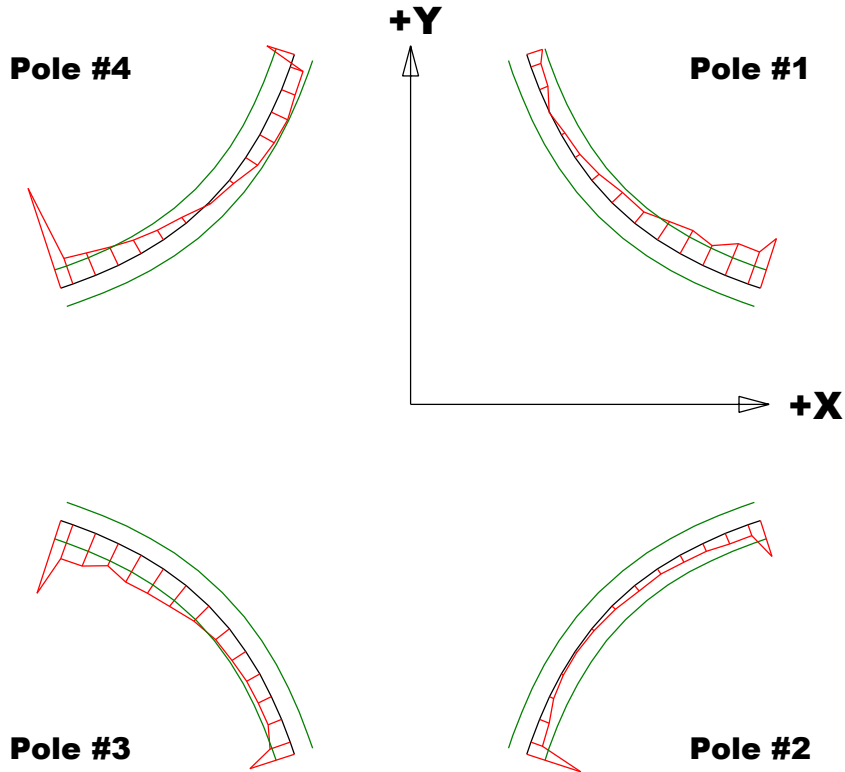
	Nominal Distance	Downstream Pole End	Upstream Pole End
Pole Tip Distance 1-3	1.510 ± .001	1.51192	1.51192
Pole Tip Distance 2-4	1.510 ± .001	1.51015	1.51221
Gap 1-2	0.6154 ± .001	0.61972	0.62249
Gap 2-3	0.6154 ± .001	0.62009	0.62141
Gap 3-4	0.6154 ± .001	0.62318	0.62497
Gap 4-1	0.6154 ± .001	0.61675	0.61511

Barcode # : 4068

Dimensions in Inch

Mfg. S/N : 1.5Q7-2/QDG003

Composite Best-fit of Pole Tips, Downstream



Black = Nominal Pole Tip
 Red = Pole Tip Deviations
 Green = +/- .001 Tolerance

Dimensions in Inch

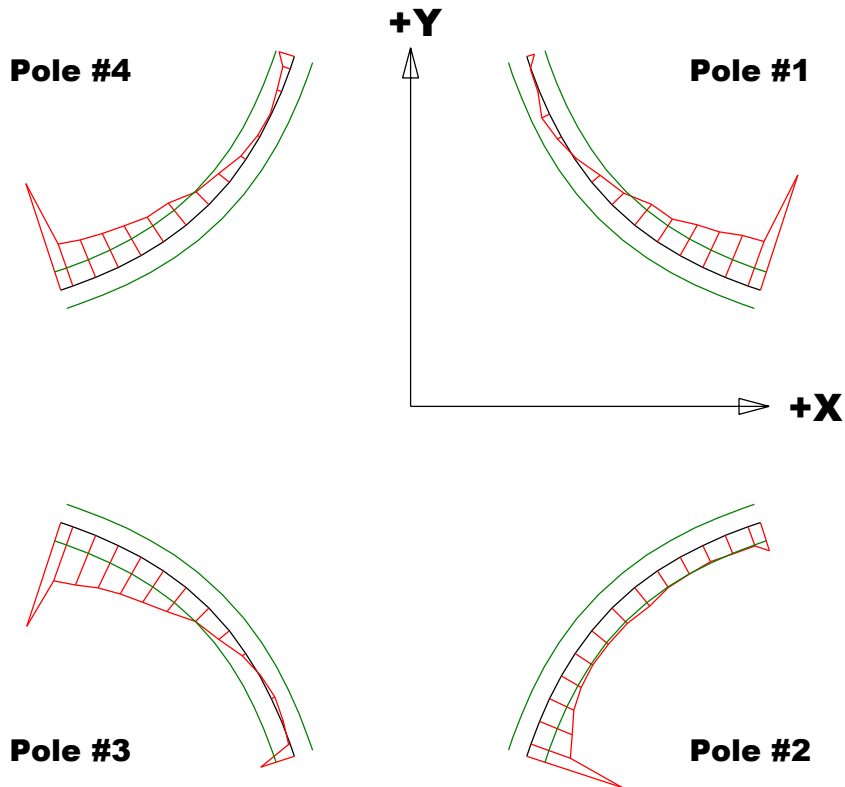
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00273	-0.00296	-0.00399	-0.00548
Max. Dev.	0.00002	-0.0001	-0.00076	0.00093

Barcode # : 4068

Mfg. S/N : 1.5Q7-2/QDG003

Composite Best-fit of Pole Tips, Upstream



Black = Nominal Pole Tip
 Red = Pole Tip Deviations
 Green = +/- .001 Tolerance

Dimensions in Inch

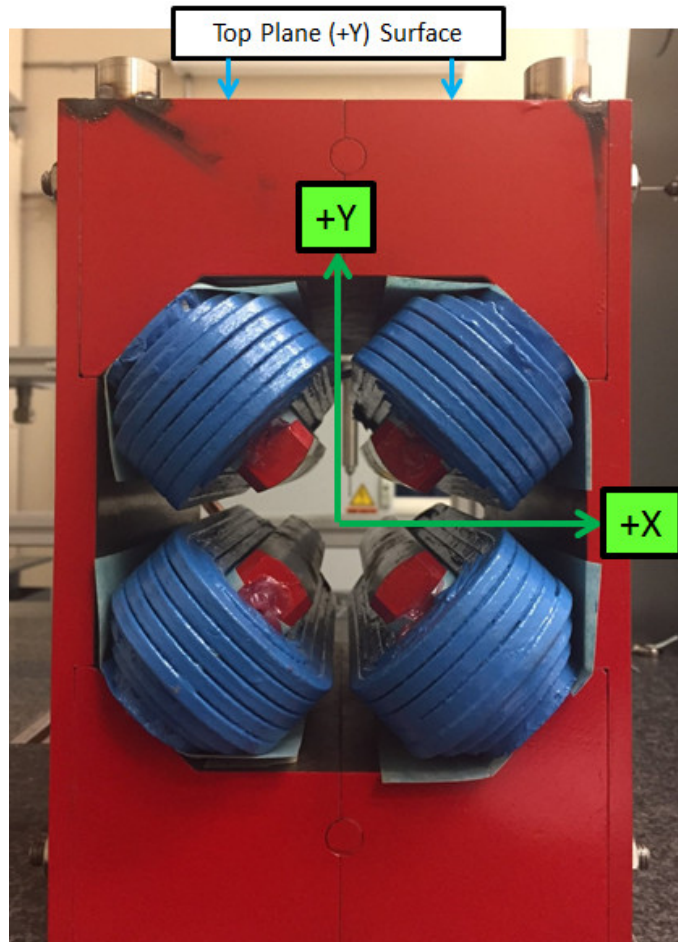
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00632	-0.00526	-0.00569	-0.00585
Max. Dev.	0.00045	-0.00093	0.00019	-0.00005

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Angle of the Composite Pole Tip Best-Fit In Relation to Top (+Y Plane)



Angle in Decimal Degrees ° :-0.02147

Angle in Milliradians :-0.37469

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